

CLAIMS

1. An electrical storage device comprising:

a positive electrode, a negative electrode, a lithium electrode and an electrolyte capable of transferring lithium ions, wherein

the lithium electrode is arranged to be out of direct contact with the negative electrode and/or the positive electrode, and

lithium ion can be supplied to the negative electrode and/or the positive electrode by flowing current between the lithium electrode and the negative electrode and/or the positive electrode through an external circuit.

2. The electrical storage device according to claim 1, wherein

the electrolyte is an aprotic organic solvent solution of a lithium salt.

3. The electrical storage device according to claim 1, wherein

the positive electrode and the negative electrode are formed on a positive electrode collector and a negative electrode collector respectively, and

each of the positive electrode collector and the negative electrode collector has an opening that penetrates front and rear surfaces.

4. The electrical storage device according to claim 1, wherein

the lithium electrode is formed on a lithium electrode collector made of a conductive porous body, and

at least part of the lithium electrode is buried into a porous portion of the lithium electrode collector.

5. The electrical storage device according to claim 1, further comprising:

an outer container made of a laminated film.

6. The electrical storage device according to claim 1, wherein

the lithium electrode is arranged to face the negative electrode and/or the positive electrode.

7. The electrical storage device according to claim 1, further comprising:

an electrode stack unit, in which more than three layers of electrode couple having the positive electrode and the negative electrode are layered.

8. The electrical storage device according to claim 1, further comprising:

an electrode stack unit, in which an electrode couple having the positive electrode and the negative electrode is rolled.

9. The electrical storage device according to claim 1, wherein

the electrical storage device is a capacitor.

10. The electrical storage device according to claim 9, wherein

the positive electrode contains a material that can reversibly carry lithium ion and/or anions as a positive electrode active material,

the negative electrode contains a material that can reversibly carry lithium ion as a negative electrode active material,

an electrostatic capacitance per unit weight of the negative electrode active material is more than three times larger than an electrostatic capacitance per unit weight of the positive electrode active material, and

a weight of the positive electrode active material is larger than a weight of the negative electrode active material.

11. The electrical storage device according to claim 10, wherein

the negative electrode active material is a thermal-processed material of an aromatic condensed polymer, and is an insoluble and infusible base having a polyacene-based skeletal structure with a hydrogen/carbon atomic ratio of 0.50 to 0.05.

12. The electrical storage device according to claim 1, wherein

a part of lithium electrode exists in the lithium electrode collector after lithium ion-supplying process.

13. An electronic apparatus including the electrical storage device according to claim 1.

14. A manufacturing method of an electrical storage device comprising:

an electrical storage device assembling step, in which sealing a positive electrode, a negative electrode, a lithium electrode and an electrolyte capable of transferring lithium ions, which are arranged to be out of direct contact with one another, are sealed; and

a lithium ion supplying step, in which lithium ion is supplied to the negative electrode and/or the positive electrode by flowing current between the lithium electrode and the negative electrode and/or the positive electrode

through an external circuit.

15. The manufacturing method of an electrical storage device according to claim 14, wherein

all amount of lithium ion is eluted from the lithium electrode after lithium ion-supplying process.

16. The manufacturing method of an electrical storage device according to claim 14, wherein

a part of lithium electrode exists in the lithium electrode collector after lithium ion-supplying process.

17. A using method of the electrical storage device according to claim 1, wherein

by using the lithium electrode as a reference electrode,

a positive potential and a negative potential can be measured, and

the potential of the positive electrode or the negative electrode can be controlled when the electrical storage device is charged or discharged.

18. A using method of the electrical storage device according to claim 1, wherein

lithium ion is supplied from the lithium electrode to the negative electrode and/or the positive electrode by flowing current between the lithium electrode and the negative electrode and/or the positive electrode through the external circuit after the electrical storage device is used, or characteristics deteriorate.